HANDLE VIA
TALENT-KEYHOLE
CONTROL SYSTEM ONLY

GUIDED MISSILE AND ASTRONAUTICS INTELLIGENCE COMMITTEE

23 September 1966

MEMORANDUM FOR: Director, National Estimates

SUBJECT: Information Additional to GMAIC Contribution on NIE 11-14-66 and NIPP-67, Sections II & III

REFERENCE: GMAIC Memorandum subject, "GMAIC contribution to NIE 11-14-66, Capabilities of Soviet General Purpose Forces", dated 17 August 1966.

1. The attached are the Guided Missile and Astronautics Intelligence Committee's final contribution to NIE 11-14-66 and NIPP-67, Section II & III.

2. Attachment contains explanatory information supplementary to that contained in attachment of reference on In-flight Reliability.

3. Attachment 2 revises paragraph 5 of reference.

4. Attachment 3 contain characteristics and performance on air-to-air, surface-to-surface and air-to-surface missile systems for inclusion in NIPP Section II, Tables IIB6, IIB5, IID15 and IID16 respectively.

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Deputy Chairman

Attachments

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ATTACHMENT 1

Effectiveness of Anti-tank Systems

Missile	SAGGER	SNAPPER	SWATTER	SAGGER	SNAPPER	SWATTER	SAGGER
Range	200m (min)	600m (min)	600m (min)	600m	2000m (max)	2500m (max)	2500m (max)
P_h	0.40	0.42	0.35	0.70	0.81	0.81	0.82
P_k (light tank)	0.65	0.59	0.71	0.74	0.70	0.81	0.81
P_k (medium tank)	0.54	0.44	0.61	0.57	0.48	0.68	0.61
P_s (light tank)	0.23	0.24	0.24	0.45	0.51	0.57	0.58
P_s (medium tank)	0.20	0.17	0.20	0.35	0.36	0.49	0.45
R_e (M-60)	0.6	0.5	0.6	1.5	4.8	>10	>10
R_e (Sheridan)	0.6	0.6	0.6	1.5	1.7	2.8	2.9
R_e (M60A1E1)	0.6	0.4	0.4	1.1	0.9	1.9	1.6

Reliability: This quantity represents the probability that the missile performs within specifications commencing with initiation of launch command. Contributing factos can be divided into three categories: command data link (wire or radio), missile, and the guidance and control equipment. Based on Free World data and known Soviet capabilities, an overall system reliability of 0.9 was assigned to the SNAPPER, SWATTER, and SAGGER systems.

P_h : Hit Probability assuming a reliable missile, stationary 7-1/2x7-½ meter target, average operator, and negligible operator offset.

P_k : Mobility/Firepower Kill Probability (Kill in which either target firepower or mobility is destroyed) given a hit on light and medium tanks represented by the Sheridan and M-60 respectively.

P_s : Single Shot Mobility/Firepower Kill Probability using 0.9 Reliability for all systems ($P_s = P_k \times P_h \times 0.9$).

R_e : Exchange Ratio (Number of tank systems destroyed per number of anti-tank systems destroyed) assumes the AT system is 1.2m defilade and ATGM fires first against the M-60 armed with a 105mm gun, or the Sheridan or M60A1E1 armed with the Shillelagh.

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ATTACHMENT 2

STATEMENT ON SA X-2 (GANEF)

It is suggested that the last three sentences of the paragraph 45 in the present Theater Forces Air Defense section of NIE 11-14-65 be replaced by the following: "The Soviets have developed a new mobile missile system, the SA-X-2 (GANEF) to provide medium to high altitude coverage for troops in the field. The fire control and acquisition radars will be mounted on self-propelled vehicles. The fire unit will provide air defense coverage up to 70,000 feet altitude and out to a range of at least 25 nm. Recent Soviet open press literature indicates that the GANEF is in the hands of PVO Voysk and on several occasions attaches have reported possible GANEF sightings. [redacted] We expect it to be deployed with operational troops shortly. A requirement may exist for a mobile SAM system capable of low altitude defense, but there is no evidence of its development. It is possible that the new quad-mounted 23 MM AA gun with on-carriage radar fire control may fill the gap in low altitude defense of field forces."

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ATTACHMENT 2

TABLE III 3

SOVIET AIR-TO-AIR MISSILE SYSTEMS
ESTIMATED CHARACTERISTICS AND PERFORMANCE

	Alkali (AA-1a,1b,1c)	Atoll (AA-2a,2b)	Anab (AA-3a)	Anab (AA-3b)	Awl (AA-4) 1/	Ash (AA-5a)	Ash (AA-5b)	AA-X-1 67-68
Year into Operation	1957-59	1959-60	1964	1968	2/	1966	1966	1967-68
Guidance	Radar beam rider	Infrared homing	Semiactive radar homing	Infrared homing	Unknown	Semiactive radar homing	Infrared homing	Combination radar homing and possibly IR
Operational Accuracy (CEP-ft)	20	10-15	20-30	10-15	30	25-50	20-25	?
Maximum Warhead Wt. (Capacity (lbs) Type	35/HE	25/HE	Unknown	Unknown	125-150/HE	150/HE or possible nuc.	150/HE or possible nuc.	Possible nuc.
Launch Weight (lbs)	205	187	575	575	750	1000	1000	?
Probable Carrier 5/	Farmer E Fishpot	Fishbed C,D,E,F, 3/	Firebar	Firebar	2/	Fiddler	Fiddler	Med. Ranger Interceptor and '67-68 TAC Fighter
Attack Capability	Tail attack. Down to sea level in fixed beam mode	Tail attack. Down to sea level	Tail; possibly nose	Tail attack. Down to sea level	Unknown	All aspect	Tail	All aspect
Maximum Firing Range (NM) 4/	3-4	4	Tail 10 and Nose 12	10	Tail-9 Nose-11	Tail 15 & Nose 16	Tail 8	?
Remarks	All-weather. May also be used in low altitude fixed beam mode requiring visual aiming.	Limited to clear air mass conditions.	All-weather	Limited to clear air mass conditions.		All-weather	Limited to clear air mass conditions.	All-weather

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TABLE IIB 6 (CONT'D)

1/ This missile has only been sighted at the Tushino Air Show in 1961.

2/ The only carrier with which this missile has been associated is the Flipper. We estimate that this aircraft will not be deployed.

3/ Atoll could be carried by all interceptor aircraft listed in Table IIB4, probably at the expense of other armament.

4/ 35,000 ft. altitude; 900 fps closing rate.

5/ With proper radar fit all interceptor aircraft could carry AAM's using beam rider or IR homing guidance. AAM's using semi-active homing must be matched to search/track radars.

TABLE IIIB 5

SOVIET TACTICAL MISSILES AND ROCKETS
CHARACTERISTICS AND PERFORMANCE OF
SURFACE-TO-SURFACE MISSILES

System Characteristics	SSC-1a (Shaddock)	SSC-2a (Salish)
IOC	1962-63	1957
Maximum Range (nm)	270 operational 20 minimum	40-60
Warhead (lbs) 4/	1,000-2,000 HE Nuc, CW	2,200 HE/CW (Nuclear possible)
Configuration	Cruise; transported in a launch tube on a wheeled vehicle	Cruise; launched from A Transporter launcher
Trajectory	Aerodynamic, low altitude low supersonic	Aerodynamic, low altitude Mach 0.80
Propulsion	Turbojet W/2 Rato bottles	Turbojet
Guidance	Unknown; probably self contained	Mid-Course-track command or Beam Rider with pre-programmed terminal maneuver
Accuracy (CEP)	0.5 nm	Unknown, Possibly a Few Hundred Feet
Over-all Reliability	60-70%	60-70%
Refire Time	No refire capability	No refire capability
Reaction Time	15 minutes after arrival at presurveyed site	15 minutes
Mobility	Limited cross-country mobility	Mobile on good roads, limited cross-country mobility

4/ While all Soviet tactical missiles could carry CW warheads, there is evidence only on the CW capabilities of SS-1b and SSC-1a

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ATTACHMENT 3 (Cont'd)

TABLE IID 15

SOVIET GENERAL PURPOSE NAVAL WEAPONS
CHARACTERISTICS AND PERFORMANCE OF SURFACE-LAUNCHED MISSILE SYSTEM

	SSC-1b (Shaddock)	SSC-2b[3/] (Samlet)
IOC	1957	1962-63
Type	Surface-Launch Cruise	Surface-Launch Cruise
Range (n. m.)	25-45	270 operational[12/] 20 minimum
Altitude (ft.)	3500	1000-3000
Speed	Mach 0.8	Low supersonic
Warhead (lbs)/ type	2200 HE/CW	1000-2000/HE Nuclear, or CW
CEP	150 ft.[X/]	150 ft. vs. ships[X/]
Guidance	Beam rider with semiactive homing	Intertial with active radar or passive IR terminal homing
Propulsion	Turbojet with RATO boost	Turbojet with two RATO bottles
Reliability		
On Launcher	?	80%
In Flight	?	85%
Overall	60-70%	70%

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ATTACHMENT 3 (Cont'd)

TABLE IID 15

SOVIET GENERAL PURPOSE NAVAL WEAPONS
CHARACTERISTICS AND PERFORMANCE OF SURFACE-LAUNCHED MISSILE SYSTEMS
(Excluding Ballistic Missiles)

Number of Launchers per Ship or Coastal Defense Unit; Ship Fill per Launcher	Two Launchers per site; 4 GM per lnchr.	Unknown
Reaction Time	5 min.	15 min.
Refire Time	15 min.	No refire

3/ SSC-2b is the Kennel modified for coastal defense purpose.

12/ The SSC-1b is similar to the SS-N-3b. If flown at 30,000 to 40,000 ft. its range could also be 450 n.m.

X/ The terminal guidance system should provide essentially unity hit probability granted successful operation of the pre-terminal phase systems. Accordingly, it can be assumed that any missile which reaches the target ship will either impact the ship, or if so intended, will pass over the ship and detonate above it by fuze action. Thus granted successful identification of its target, the hit probability is essentially equal to the functional reliability of its component systems.

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TABLE IIID 16

SOVIET GENERAL PURPOSE NAVAL WEAPONS
CHARACTERISTICS AND PERFORMANCE OF AIR-TO-SURFACE MISSILE SYSTEMS

	AS-1 (Kennel)	AS-2 (Kipper)	AS-4 (Kitchen)
Initial Operational Capability	1957	1960-1961	1966-1967
Max. Operational Range (nm)	55	100	300 or 160 1/
Guidance			
Against Ships	Beam riding with semi-active homing.	Autopilot with command overide; active radar terminal homing 2/	Unknown (possibly inertial or track/command; with homing against ships).
Against Well Defined Targets on Land	Beam riding	Autopilot with command overide.	
Accuracy (CEP at Max. Range)			
Against Ships 3/	150 feet	150 feet	150 feet
Against Land Targets	1 n.m.	1 to 2 n.m.	1 to 2 n.m.
Warhead			
Type	HE, or BW/CW	HE or nuclear, possible CW	HE or nuclear
Weight (lbs)	2,200	2,200	2,200
Speed (Mach No.)	0.8 to 0.85	Launch 0.8; below 10,000 ft, M1.2-1.4	3.0 to 4 at 80,000. 4/

TABLE VIII 16 (CONT'D)

	AS-1 (Kennel)	AS-2 (Kipper)	AS-4 (Kitchen)
Reliability 5/			
On Launcher	90%	80%	80%
In Flight	80%	70%	70%
Overall	72%	55%	55%
Employment	Primarily antiship; could be used against land targets.	Primarily antiship; could be used against land targets.	Can be used against both land and ship targets.
Carrier Aircraft	Badger B	Badger C	Blinder B
Number of Missiles	2	1	1
Launch Alt. (ft.) (max.)	20,000	36,000 6/	About 40,000
Launch Speed (Kts) (max.)	240(IAS)	Max. cruise	High subsonic

1/ The first figure in this entry is against land targets and the second against ship targets.

2/ A passive homing capability may also be included.

3/ The terminal guidance system should provide essentially unity hit probability granted successful operation of the pre-terminal phase systems. Accordingly, it can be assumed that any missile which reaches the target ship will either impact the ship, or if so intended, will pass over the ship and detonate above it by fuze action. Thus granted successful identification of its target, the hit probability is essentially equal to the functional reliability of its component systems.

4/ The terminal phase of the AS-4 flight profile would be at low supersonic speed.

5/ These reliability rates may be high, since the effects of Soviet operational concepts and troop training standards are at least as important as technical characteristics in determination of system reliability. We have no reliable basis for estimating these effects.

TABLE IIID 16 (CONT'D)

6/ Flight profile launch at 36,000 ft., descend to approx. 10,000 ft. about 2 min. after launch, level off and run into target at low level, near sea level. Total flight time about 7 minutes.

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